Applicant : John Peterson   Attorney's Docket No.: 07844-485001 / P449
Serial No. : 09/941,427
Filed : August 28, 2001
Page : 13 of 19

REMARKS

Claim 30 is currently pending, of which claims 1, 15, 16, and 30 are independent. Claims 1, 2, 12, 14-17, 27, and 30 are amended for clarity and to provide clearer antecedent basis. No new matter is added. Reconsideration of the action mailed August 10, 2005, is requested in light of the foregoing amendments and the following remarks.

The Examiner rejected claims 2, 12, 14, and 17 under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner rejected claims 1-6, 11-21, and 26-30 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,778,207 to Lee et al. ("Lee"). The Examiner rejected claims 7-10 and 22-25 under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of "Fundamentals of Texture Mapping and Image Warping" by Heckbert ("Heckbert").

Drawing Objection

The Examiner objected to FIG. 3 under 37 CFR § 1.83(a) as failing to show reference numbers identified in the specification. The applicant has amended the paragraph beginning on line 15 of page 5 in the specification to conform to the reference numbers shown in FIG. 3. The applicant submits that FIG. 3 is in compliance with 37 CFR § 1.83(a).

Section 112, Second Paragraph Rejections

The Examiner rejected claims 2 and 17 as being indefinite. Specifically, the Examiner stated that the claimed feature of "the modified version of the first image" lacks antecedent basis. The applicant has amended claims 2 and 17 to recite "a modified version of the first image" and respectfully submits that claims 2 and 17 satisfy the requirements of § 112, second paragraph.

The Examiner rejected claims 12 and 27 as being indefinite. Specifically, the Examiner stated that "transforming the modified version of the second image" in claim 12 lacks antecedent basis. The applicant respectfully disagrees. Claim 12 depends from claim 1, which recites "applying the transform to each of the plurality of derived component images in the composite image to generate a plurality of transformed component images." Claim 1 also recites the composite image as including "the modified version of the second image." Consequently, by

applying a transform to each of the plurality of derived component images in the composite image, the transform is necessarily applied to the modified version of the second image. However, to expedite prosecution, the applicant has amended claim 12 to recite "applying the transform to the modified version of the second image." The applicant respectfully submits that claim 12 satisfies the requirements of § 112, second paragraph.

Claim 27 has been amended to recite "apply the transform to the modified version of the second image" and therefore satisfies the requirements of § 112, second paragraph for the same reasons set forth with respect to claim 12.

The Examiner rejected claim 14 as being indefinite. Specifically, the Examiner stated that the "determining and transforming steps" lack antecedent basis. The applicant respectfully disagrees. However, to expedite prosecution, the applicant has amended claim 14 to recite "the determining a transformation and applying the transform are automatically performed in response to the user input." Claim 14 depends from claim 1, which recites "determining a transformation" and "applying the transform." The applicant respectfully submits that claim 14 satisfies the requirements of § 112, second paragraph.

Section 102 Rejections

Claim 1 stands rejected as anticipated by Lee. Claim 1, as amended, recites a method for shifting a perspective of a composite image. A composite image is derived from multiple component images. The composite image includes a first image and a second image. The composite image includes the first image and a modified second image. The first image is the center of projection for the composite image and the modified second image is a version of the second image that has been corrected for perspective distortion with respect to the first image. Claim 1 also recites receiving an instruction to shift the perspective of the composite image to make the second image the center of projection of the composite image instead of the first image.

To shift the perspective, a transform is determined for mapping a set of reference points in the modified version of the second image to a corresponding set of reference points in the second image. Thus, the transform, when applied to the modified version of the second image, transforms the modified image into the second image (*i.e.*, the original component image without

correction for perspective distortion). The transform is applied to each of the images that make up the composite image to generate the second image and a plurality of modified component images. The modified version of the second image is transformed into the second image and the other component images of the composite image are modified to have the second image as their center of projection (*i.e.*, the other component images are corrected for perspective distortion relative to the second image). Consequently, the perspective of the composite image is shifted from the first image to the second image.

The Examiner states that Lee discloses the features of claim 1. The applicant respectfully disagrees. In Lee, a system is disclosed for selecting a particular region in a composite image to provide a "zoom" view from a perspective of a particular virtual camera. *See* col. 1, lines 6-12; col. 3, lines 5-23; col. 6, lines 60-65. A plurality of individual images taken from different camera positions and angles are merged to form the composite image. *See* col. 5, lines 21-44. To form the composite image, a first image is chosen as the center of the composite image and the remaining images are then warped to the plane of the first image. *See* col. 5, lines 32-35. A view region of the composite image is then selected by a user to generate a "zoom" field of view from the composite image. *See* col. 5, liens 44-47; col. 6, lines 60-63. The portion of the composite image within the selected view region is then warped to a designated plane corresponding to a direction of a virtual camera to create a distinct view image. *See* col. 5, lines 44-47.

The Examiner states that Lee discloses receiving an instruction to shift a perspective of the composite image to make the second image the center of projection of the composite image at col. 2, lines 17-18 and FIGS. 9 and 10. The applicant respectfully disagrees. Lines 17-18 of col. 2 read, in pertinent part, as follows:

> A portion of the mosaic is then selected using a PTZ control input to a processor and warped into a virtual camera view.

The cited section, from the summary portion of Lee, discloses the selection of a particular view region from a mosaic image (i.e., a composite image). The selected region is warped into a virtual camera view. Specifically, the selected region from the composite image is warped to a designated plane for a particular virtual camera view.

See col. 5, lines 44-47.   Additionally, FIG. 9 shows a composite image formed from two images while FIG. 10 shows an example of a view region of the composite image in FIG. 9 that has been warped to create the separate view image.

The selection of a portion of a composite image does not disclose or suggest shifting a perspective to make a different image of the composite image the center of projection. Creating a view image from a portion of a composite image does not disclose or suggest shifting the center of projection for an entire composite image. Instead, Lee discloses the creation of two separate composite images, where the composite image representing the view region does not include all of the component images of the first composite image. Thus, Lee selects an arbitrary portion of the composite image to generate a new image and does not identify a particular component image to shift the center of projection of the composite image.

The Examiner further states that region 321 in FIG. 9 represents the second image selected as the new center of projection. Region 321, however, simply represents a feature that is present in both images I1 and I2 such that the composite image can be formed from the two images by referencing the common feature in both images. *See* FIGS. 7-9; col. 6, lines 27-48. Thus, region 321 in FIG. 9 represents the common feature from the two images I1 and I2 that are merged into the composite image and not a separate component image of the composite image. The region 321 is not an image selected from the composite image and therefore can not be an image selected as a new center of projection for the composite image. Lee does not disclose or suggest selecting an image of a composite image as a new center of projection for the composite image.

Moreover, Lee does not disclose or suggest changing the perspective of the entire composite image, as required by claim 1. Instead, Lee only selects a portion of the composite image and only this portion of the image is warped to generate the new view image. *See* FIG. 9; col. 6, lines 60-65. The view image shown in FIG. 10 is only a subset of the composite image. Thus, an image of the composite image is not selected as the

center of projection for the composite image as a whole because the view image does not include <u>all</u> the component images of the original composite image.

The Examiner also states that Lee discloses determining a transform for mapping a set of reference points in a modified version of a second image to a corresponding set of reference points in the second image at col. 3, lines 30 and col. 5 lines 35. The applicant respectfully disagrees.

Lines 32-35 of col. 5 read, in pertinent part, as follows:

In an embodiment with a field of view that is central to such an array, for example camera 92, the image planes of the other cameras can be warped to the image of the central one. This avoids the need to map the points on one of the images.

The cited section of col. 5 discloses the creation of a composite image from a collection of images using one image as the center of projection and then warping the remaining images to the plane of the selected center of projection. As a result, the image chosen as the central image does not need to be modified to create the composite image. Therefore, the cited portion of Lee only discloses the generation of a composite image from a set of images, not a transform for a component image of an existing composite image. In contrast, claim 1 requires defining a transform that maps a modified version of a component image in the composite image into the original unmodified image. In other words, a transform for conversion a component image modified for perspective distortion into an original unmodified image. Warping images to a central image in order to create a first composite image does not disclose or suggest a transform that maps a set of reference points in a modified version of an image to a set of reference points in the image.

Additionally, lines 30-33 of col. 3 read, in pertinent part, as follows:

The transform can be derived in two ways: with predefined geometric information on the camera orientations and image-forming properties or, preferably, using predefined registration points in the images themselves.

The cited section of col. 3 discloses a transform used to warp a selected view region of a composite image into a new image providing a representation of a selected view region from a particular virtual camera perspective. The entire selected region is warped to the plane of the

Applicant : John Peterson   Attorney's Docket No.: 07844-485001 / P449
Serial No. : 09/941,427
Filed   : August 28, 2001
Page   : 18 of 19

virtual camera. *See* col. 5, lines 45-47. Lee does not disclose or suggest a transform for mapping a modified component image in a composite image into an unmodified version of the image.

Finally, the Examiner also states that Lee discloses applying a transform to each of the plurality of derived component images in the composite image to generate a plurality of images having the second image as their center of projection at col. 7, line 61 and col. 5, lines 33-34. The applicant respectfully disagrees.

Lines 59-61 of col. 7 read, in pertinent part, as follows:

Although in the embodiments above two or three cameras are discussed to explain the invention, the number of cameras can be any number of cameras.

The cited section discloses that the number of real cameras used to generate the distinct component images used to form a composite image can include more than the three cameras in the disclosed embodiments. However, the initial creation of distinct images and does not disclose or suggest a composite image or a transform applied to component images of the composite image.

Additionally, lines 33-34 of col. 5, as detailed above, disclose the creation of a composite image from the images generated by a number of cameras. The cited section does not disclose or suggest applying a transform to a plurality of component images in an existing composite image having a first image as a center of projection in order to modify the component images to have a second image as the center of projection.

Furthermore, Lee fails to disclose or suggest applying the transform to a modified version of an image to generate an unmodified image, as required by claim 1. Lee does not disclose or suggest transforming any component images of a composite image into their unmodified form. Lee also does not disclose or suggest that the images generated by applying the transform are corrected for perspective distortion relative to a selected center of projection, as required by claim 1. The applicant respectfully submits that claim 1, as well as claims 2-14, which depend from claim 1, are in condition for allowance.

Claim 15 stands rejected as anticipated by Lee. Claim 15 recites a computer-implemented image processing method that includes receiving a single user input including an instruction to change a perspective of the composite image to make the second

image the center of projection. For the reasons set forth above with respect to claim 1, claim 15 is also in condition for allowance.

Claim 16 stands rejected as anticipated by Lee. Claim 16 recites a computer program product that includes receiving an instruction to shift the perspective of the composite image to make the second image the center of projection. For the reasons set forth above with respect to claim 1, claim 16 as well as claims 17-29, which depend from claim 16, are also in condition for allowance.

Claim 30 stands rejected as anticipated by Lee. Claim 30 recites a computer program product for processing an image that includes receive a single user input including an instruction to change a perspective of the composite image to make the second image the center of projection. For the reasons set forth above with respect to claim 1, claim 30 is also in condition for allowance.

The applicant respectfully requests that all pending claims be allowed.

By responding in the foregoing remarks only to particular positions taken by the examiner, the applicant does not acquiesce with other positions that have not been explicitly addressed. In addition, the applicant's arguments for the patentability of a claim should not be understood as implying that no other reasons for the patentability of that claim exist.

Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: _10 November, 2005_

Brian J. Gustafson
Reg. No. 52,978

Customer No. 21876
Fish & Richardson P.C.
Telephone: (650) 839-5070
Facsimile: (650) 839-5071

50298364.doc